WHAT IS CLAIMED IS:

1. An implant for surgical insertion, implantation, or location within a body, comprising:

a pressure sensor for measuring intra-body pressure;

a controller coupled to the pressure sensor for acquiring pressure data from the pressure sensor;

one or more acoustic transducers for converting energy between electrical energy and acoustic energy, the one or more acoustic transducers configured for at least one of converting acoustic energy from a source external to the implant into electrical energy and transmitting an acoustic signal comprising the pressure data to a location external to the implant; and

an energy storage device coupled to at least one of the one or more acoustic transducers, the energy storage device configured for storing electrical energy converted by the one or more acoustic transducers, the energy storage device coupled to the controller for providing electrical energy to support operation of the implant.

2. The implant of claim 1, wherein the one or more acoustic transducers comprise an acoustic transmitter coupled to the controller for transmitting the acoustic signal to a location external to the body.

3. The implant of claim 1, wherein the one or more acoustic transducers comprises an energy exchanger coupled to the energy storage device, the energy

exchanger comprising a piezoelectric layer for converting acoustic energy striking the film into electrical energy.

4. The implant of claim 1, wherein the one or more acoustic transducers comprise a transducer configured to operate alternatively as either an energy exchanger or an acoustic transmitter.

5. The implant of claim 1, wherein the one or more acoustic transducers comprise:

a substrate comprising a cavity; and

a substantially flexible piezoelectric layer attached to the substrate across the cavity.

6. The implant of claim 5, further comprising a first electrode attached to an external surface of the piezoelectric layer and a second electrode attached to an internal surface of the piezoelectric layer.

7. The implant of claim 5, wherein the substrate comprises an array of cavities, and wherein the piezoelectric layer is bonded to the substrate over the cavities.

8. The implant of claim 5, wherein the piezoelectric layer comprises poly vinylidene fluoride.

9. The implant of claim 1, wherein the energy storage device comprises a rechargeable device, the rechargeable device being rechargeable by the electrical energy converted by the one or more acoustic transducers.

10. The implant of claim 9, wherein the energy storage device comprises a capacitor.

11. The implant of claim 9, wherein the energy storage device comprises a first relatively fast-charging capacitor and a second relatively slow-charging capacitor, the first and second capacitors being coupled to the one or more acoustic transducers such that the first capacitor is charged first and the second capacitor is charged only upon substantially charging of the first capacitor.

12. The implant of claim 1, wherein the pressure sensor comprises a variable capacitance pressure sensor.

13. The implant of claim 1, further comprising a rectifier coupled to the energy storage device for converting alternating current electrical energy converted by the one or more acoustic transducers into direct current electrical energy that may be stored by the energy storage device.

14. The implant of claim 1, wherein the controller comprises an analog-to-digital converter for converting analog signals from the pressure sensor into digital pressure data.

15. The implant of claim 1, wherein the controller comprises reset circuitry for resetting the controller when the energy storage device is being charged by electrical energy from the one or more acoustic transducers.

16. The implant of claim 1, wherein the controller comprises circuitry for automatically switching the implant off when the electrical energy available from the energy storage device falls below a predetermined threshold.

17. The implant of claim 1, wherein the controller comprises circuitry for extracting one or more commands from the electrical energy converted by the one or more transducers, the controller configured for controlling the implant in response to the one or more commands.

18. The implant of claim 17, wherein the controller comprises a switch for activating or deactivating at least one of the energy storage device and the pressure sensor in response to the one or more commands.

19. The implant of claim 1, wherein the controller comprises circuitry for monitoring when the one or more acoustic transducers stop converting electrical energy,

the controller configured for activating the implant when electrical energy is no longer being converted by the one or more acoustic transducers.

20. The implant of claim 1, wherein the controller comprises an encoder coupled to at least one of the one or more acoustic transducers for generating a digital signal to be transmitted by the at least one of the one or more acoustic transducers, the digital signal comprising the pressure data.

21. An implant for surgical insertion, implantation, or location within a body, comprising:

a substrate comprising an opening therethrough;

a pressure sensor attached to the substrate adjacent the opening, the pressure sensor comprising an active area exposed via the opening for measuring intra-body pressure;

a controller attached to the substrate and coupled to the pressure sensor for acquiring pressure data from the pressure sensor;

an energy exchanger attached to the substrate, the energy exchanger coupled to the controller for at least one of converting acoustic energy from a source external to the implant into electrical energy and transmitting an acoustic signal comprising the pressure data to a location external to the implant;

an energy storage device attached to the substrate and coupled to the energy exchanger, the energy storage device configured for storing electrical energy converted

by the acoustic transducer, the energy storage device configured for providing electrical energy to support operation of the implant; and

a casing receiving the substrate for substantially sealing the implant therein.

22. The implant of claim 21, wherein the casing comprises one or more openings through which the active area of at least one of the pressure sensor and the energy exchanger is exposed to a region exterior to the casing.

23. The implant of claim 21, wherein the active area of the pressure sensor is covered with a seal, the seal selected from the group consisting of silicone, Parylene C, and a relatively thin metal layer.

24. The implant of claim 21, wherein the casing comprises a relatively thin foil for sealingly exposing at least one of the pressure sensor and the energy exchanger to a region exterior to the casing.

25. The implant of claim 24, wherein the casing comprises a fluid therein for acoustically coupling the energy exchanger to the foil.

26. The implant of claim 24, wherein the casing comprises a fluid therein for coupling the active area of the pressure sensor to the foil, thereby exposing the active area to pressure at the region exterior to the casing.

27. A method for making an energy exchanger for converting between acoustic and electrical energy, the method comprising:

applying a conductive layer onto a piezoelectric layer;

applying the piezoelectric layer to a surface of a substrate using an adhesive, the surface comprising one or more cavities therein;

applying pressure between the piezoelectric layer and the substrate, thereby causing the piezoelectric layer to become at least partially depressed within the one or more cavities; and

curing the adhesive.

28. The method of claim 27, wherein the piezoelectric layer comprises first and second surfaces, and wherein the step of applying a conductive layer comprises applying first and second conductive layers onto the first and second surfaces of the piezoelectric layer.

29. The method of claim 27, wherein the piezoelectric layer comprises a layer of fluorocarbon polymer.

30. The method of claim 29, further comprising etching the layer of fluorocarbon polymer to cleave at least one of carbon-fluorine bonds, carbon-carbon bonds, and carbon-hydrogen bonds.

31. The method of claim 30, wherein the layer of fluorocarbon polymer is etched using a sodium naphthalene solution.

32. The method of claim 30, wherein the layer of fluorocarbon polymer is etched using a gas phase plasma treatment including at least one of oxygen, air, Helium, and Argon plasma.

33. The method of claim 27, wherein the adhesive comprises one of an epoxy and an acrylic adhesive.

34. The method of claim 33, wherein the step of curing the adhesive comprises exposing the substrate to light.

35. The method of claim 33, wherein the bonding step comprises atomizing the adhesive over the substrate.

36. The method of claim 27, wherein the substrate comprises a plurality of cavities, and wherein the method further comprises dividing the substrate into a plurality of transducer cells.

37. The method of claim 27, further comprising attaching the bonded piezoelectric and substrate layers to a substrate.

38. The method of claim 37, further comprising attaching an energy storage device to the substrate, and coupling the energy storage device to the piezoelectric layer for storing electrical energy converted from acoustic energy impinging upon the piezoelectric layer.

39. The method of claim 38, wherein the substrate comprises a rectifier coupled to the piezoelectric layer and the energy storage device for converting alternating current electrical energy converted by the piezoelectric layer into direct current electrical energy for storage by the energy storage device.

40. The method of claim 37, further comprising attaching a pressure sensor to the substrate, and coupling the pressure sensor to the piezoelectric layer, the piezoelectric layer configured for converting pressure data generated by the pressure sensor into acoustic energy for transmission to an external location.

41. A method for acquiring data from an implant implanted within a patient's body using an external transducer located outside the patient's body, the method comprising:

transmitting a first acoustic signal from the external transducer into the patient's body, the first acoustic signal being converted into electrical energy for operating the implant; and

receiving a second acoustic signal from the implant, the acoustic signal comprising data related to a condition with the patient's body measured by the implant.

42. The method of claim 41, wherein the external transducer automatically switches from an energizing mode after transmitting the first acoustic signal to a receiving mode for receiving the second acoustic signal.

43. The method of claim 42, wherein the external transducer automatically switches back to the energizing mode after receiving the second acoustic signal, and wherein the method further comprises transmitting a third acoustic signal from the external transducer into the patient's body, the third acoustic signal being converted into electrical energy for operating the implant.

44. The method of claim 41, wherein the first acoustic signal comprises an identification code identifying a target implant.

45. The method of claim 44, wherein the implant confirms that the identification code matches the implant, whereupon the implant samples the data and transmits the second acoustic signal.

46. The method of claim 41, wherein the first and second acoustic signals are transmitted simultaneously.

47. The method of claim 41, wherein the first and second acoustic signals comprise first and second frequencies, respectively, that are different from one another.

48. The method of claim 41, wherein the implant converts the first acoustic signal into electrical energy for charging an energy storage device of the implant.

49. The method of claim 48, wherein the implant automatically discontinues charging the energy storage device when the energy storage device reaches a predetermined threshold voltage.

50. The method of claim 48, wherein the energy storage device comprises a first relatively fast-charging device and a second relatively slow-charging device, and wherein the converted electrical energy is used to charge the first device first, and is used to charge the second device only upon substantially charging the first device.

51. The method of claim 50, wherein the implant transmits the second acoustic signal immediately upon substantially charging the first device, thereby responding to the first acoustic signal in about 5-200 milliseconds or less.

52. The method of claim 48, wherein the external transducer detects whether the implant is capable of receiving additional energizing signals, and wherein the external transmitter transmits one or more additional energizing signals when the external transducer detects that the implant is capable of receiving additional energizing signals, thereby further recharging the energy storage device.

53. The method of claim 48, wherein the implant transmits the second acoustic signal until the energy storage device falls below a predetermined threshold voltage.

54. The method of claim 41, wherein the implant converts the first acoustic signal from an alternating signal to a direct current electrical signal.

55. The method of claim 41, wherein the implant transmits the second acoustic signal for a predetermined time.

56. The method of claim 55, wherein the first acoustic signal comprises instructions for the implant, one of the instructions comprising the predetermined time.

57. The method of ~~claim 41~~, wherein the external transducer extracts the data from the second acoustic signal.

58. The method of claim 41, wherein the implant comprises a pressure sensor, and wherein the data comprises intra-body pressure data.

59. The method of claim 41, wherein the first acoustic signal comprises a multi-frequency signal, and wherein the second acoustic signal comprises a single frequency signal identifying an optimal frequency for communicating with the implant.

60. The method of claim 59, wherein the first acoustic signal comprises at least one of a scanning signal and a broadband signal.

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